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| EXAMINER | |
|---|---|
| YEUNG LOPEZ, FEIFEI | |
| **ART UNIT** | **PAPER NUMBER** |
| 2826 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/567,883 | STEIN ET AL. | |
| | Examiner | Art Unit | |
| | FEI FEI YEUNG LOPEZ | 2826 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *18 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-34,42-45 and 47-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31,33,42-45 and 47-51* is/are rejected.

7)☒ Claim(s) *32 and 34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/18/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 18, 2008 has been entered.

### *Claim Objections*

2. Claims 24 and 26 are objected to because of the following informalities:

In claim 24, "said mirror layer" lacks antecedent basis.

In claim 26, "said carrier" lacks antecedent basis.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1,3, 5-15,17,19-22,25-27,33,44-45, and 48-51 are rejected under 35 U.S.C. 102(e) as being anticipated by Ou et al (PG Pub 2004/0090779 A1).

5. Regarding claim 1, Ou teaches a radiation-emitting semiconductor component comprising: a semiconductor body that includes a first principal surface, a second principal surface and an epitaxially formed semiconductor layer sequence (layers 11-17 in fig. 3) with an electromagnetic radiation generating active zone (layers 13 and 15), said epitaxially formed semiconductor layer sequence forming the semiconductor body and being disposed between the first and the second principal surfaces; a first non-epitaxially formed current spreading layer (layer 18) disposed on said first principal surface and electrically conductively connected to said semiconductor layer sequence; and a second non-epitaxially formed current spreading layer (layer 20) disposed on said second principal surface and electrically conductively connected to said semiconductor layer sequence~ wherein the first current spreading layer comprises a first material and the second current spreading layer comprises a second material (such as Cr/Al, see paragraph [0021]) different from the first material (such as NiO/Au).

6. Regarding claim 3, Ou teaches the radiation-emitting semiconductor component as in claim 1, wherein at least one of said current spreading layers contains a material that is transparent to the generated radiation (one of the suggested materials for layer 18 is indium tin oxide, which is transparent to visible light emitted by the device, also see paragraph [0020]).

7. Regarding claim 5, Ou teaches the radiation-emitting semiconductor component as in claim 3, wherein-said radiation-transparent material contains an oxide (paragraph [0021]).

8. Regarding claim 6, Ou teaches the radiation-emitting semiconductor component as in claim 5, wherein said oxide is a metal oxide (paragraph [0021]).

9. Regarding claim 7, Ou teaches the radiation-emitting semiconductor component as in claim 3, wherein said radiation-transparent material contains ITO and/or InO (paragraph [0021]).

10. Regarding claim 8, Ou teaches the radiation-emitting semiconductor component as in claim 3, wherein-said radiation-transparent material contains ZnO (paragraph [0021]).

11. Regarding claim 9, Ou teaches the radiation-emitting semiconductor component as in claim 3, wherein said radiation-transparent material contains SnO (paragraph [0021]).

12. Regarding claim 10, Ou teaches the radiation-emitting semiconductor component as in claim 1, wherein at least one of said current spreading layers contains A1, Ga, In, Ce, Sb and/or F (paragraph [0021]).

13. Regarding claim 11, Ou teaches the radiation-emitting semiconductor component as in claim 1, wherein disposed on at least one of said current spreading layers is a mirror layer (Au layer 19, which reflects light, thus may be used as a mirror. see paragraph [0021]).

14. Regarding claim 12, Ou teaches the radiation-emitting semiconductor component as in claim 11, wherein said mirror layer (layer 19 in fig. 3) is disposed on the side of said current spreading layer facing away from said semiconductor layer sequence (layers 11-17).

15. Regarding claim 13, Ou teaches the radiation-emitting semiconductor component as in claim 11, wherein said mirror layer (Au layer 19 in fig. 3) is electrically conductive.

16. Regarding claim 14, Ou teaches the radiation-emitting semiconductor component as in claim 11, wherein said mirror layer contains a metal (such as Au, paragraph [0021]).

17. Regarding claim 15, Ou teaches the radiation-emitting semiconductor component as in claim 11, wherein said mirror layer contains Au, Ag, A1 and/or Pt (paragraph [0021]).

18. Regarding claim 17, Ou teaches the radiation-emitting semiconductor component as in claim 1, wherein said semiconductor layer sequence contains at least one n- and/or p-conductive layer (cladding layer 12 in fig. 3).

19. Regarding claim 19, Ou teaches the radiation-emitting semiconductor component as in claim 17 wherein the current spreading layer on the side comprising the p-conductive layer of the semiconductor layer sequence contains ZnO (paragraph [0021]).

20. Regarding claim 20, Ou teaches the radiation-emitting semiconductor component as in claim 17, wherein the current spreading layer on the side comprising the n-conductive layer of the semiconductor layer sequence contains SnO (layers 16 and 12

have opposite conductivity and they can be either n type of p type. Layer 18 or 20 may be made of SnO. See paragraph [0021]).

21. Regarding claim 21, Ou teaches the radiation-emitting semiconductor component as in claim 1, wherein said radiation-emitting semiconductor component is affixed to a carrier (substrate 10a in fig. 3).

22. Regarding claim 22, Ou teaches the radiation-emitting semiconductor component as in claim 21, wherein said carrier contains GaAs (paragraph [0022]).

23. Regarding claim 25, Ou teaches the radiation-emitting semiconductor component as in claim 1, wherein disposed on at least one of the first current spreading layer and the second current spreading layer is a contact surface (surface of layer 18 contacting layer 17 in fig. 3) for electrical contacting.

24. Regarding claim 26, Ou teaches the radiation-emitting semiconductor component as in claim 25, wherein said contact surface is disposed on the side of said semiconductor layer sequence opposite to a carrier (layer 10a in fig. 3).

25. Regarding claim 27, Ou teaches the radiation-emitting semiconductor component as in claim 25, wherein said contact surface has on the side facing said semiconductor layer sequence a layer that reflects the generated radiation (Au layer 18 reflects light, see fig. 3).

26. Regarding claim 33, Ou teaches the radiation-emitting semiconductor component as in claim 1, wherein said semiconductor layer sequence contains a III/V semiconductor, preferably $In_xGa_y Al_{1-x-y}P$, where $0 \leq x \leq 1$, $0 \leq y \leq 1$ and $x + y \leq 1$, $In_xGa_y$

$Al_{1-x-y}N$ (layer 13, see paragraph [0021]), where $0 \leq x \leq 1$, $0 \leq y \leq 1$ and $x + y \leq 1$, or $In_xGa_y$ $Al_{1-x-y}As$, where $0 \leq x \leq 1$, $0 \leq y \leq 1$ and $x + y \leq 1$.

27. Regarding claim 44, Ou teaches the radiation-emitting semiconductor component as in claim 17, wherein the current spreading layer on the side comprising the n-conductive layer of the semiconductor layer sequence contains SnO and Sb (both layers 18 and 20 may contain SnO and Sb, see paragraph [0021]).

28. Regarding claim 45, Ou teaches the radiation-emitting semiconductor component as in claim 1, wherein the first current spreading layer and the second current spreading layer contain an oxide (paragraph [0021]).

Regarding claim 48, Ou discloses that epitaxially formed layers 13 and 17 may be made of GaN and that layers 18 and 20 may be made of ZnO. Note that GaN and ZnO have lattice mismatch.

29. Regarding claim 49, Ou teaches a radiation-emitting semiconductor component comprising: a semiconductor body that includes a first principal surface, a second principal surface and an epitaxially formed semiconductor layer sequence (layers 11-17 in fig. 3) with an electromagnetic radiation generating active zone (layers 13 and 15), said epitaxially formed semiconductor layer sequence forming the semiconductor body and being disposed between the first and the second principal surfaces; a first non-epitaxially formed metal oxide current spreading layer (layer 18) disposed on said first principal surface and electrically conductively connected to said semiconductor layer sequence; and a second non-epitaxially formed metal oxide current spreading layer (layer 20) disposed on said second principal surface and electrically conductively

connected to said semiconductor layer sequence wherein the first current spreading layer comprises a first material and the second current spreading layer comprises a second material (such as indium tin oxide, see paragraph [0021]) different from the first material (such as zinc oxide).

30. Regarding claim 50, Ou teaches the radiation-emitting semiconductor component as in claim 1, wherein the first current spreading layer (layer 18) contains ZnO and the second current speading layer contains SnO (layer 20 made of material such as indium tin oxide, see paragraph [0021]).

31. Regarding claim 51, Ou teaches the radiation-emitting semiconductor component as in claim 49, wherein the first current spreading layer (layer 18) contains ZnO and the second current speading layer contains SnO (layer 20 made of material such as indium tin oxide, see paragraph [0021]).

## *Claim Rejections - 35 USC § 103*

32. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

33. Claims 2, 4,16, and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ou et al (PG Pub 2004/0090779 A1) as applied to claims 1 and 11 above, and further in view of Chen et al (PG Pub 2002/0137244 A1).

34. Regarding claim 2, Ou remains as applied in claim 1. However, Ou does not teach at least one of said two principal surfaces comprising said current spreading layers has a microstructure. In the same field of endeavor, Chen teaches a principal surface of a current spreading layer (layer 68 in fig. 6) having a microstructure (roughened surface, see paragraph [0038]) for the benefit of improving light-emitting efficiency (see paragraph [0038]). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to include in the least one of said two principal surfaces comprising said current spreading layers a microstructure in Ou's device, for the benefit of improving light-emitting efficiency, as disclosed by Chen.

35. Regarding claim 4, Ou remains as applied in claim 1. Furthermore, Ou teaches both current spreading layers (layers 18 and 20 in fig. 3) contain a material that is transparent to the generated radiation (such as indium tin oxide, see paragraph [0021]).

36. Regarding claim 16, Ou remains as applied in claim 1. However, Ou does not teach said principal surface has a microstructure on the side of said semiconductor layer sequence facing away from said mirror layer. Chen teaches a principal surface of a current spreading layer (layer 68 in fig. 6) below a light emitting structure (layer 64) having a microstructure (roughened surface between layers 66 and 68, see paragraph

[0038]) for the benefit of improving light-emitting efficiency (see paragraph [0038]). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a microstructure between layers 20 and 10a, which is below a light emitting structure (layers 13) and which is on the side of said semiconductor layer sequence away from said mirror layer (layer 19), of Ou's device, for the benefit of improving light-emitting efficiency, as disclosed by Chen.

37. Regarding claim 28, Ou in view of Chen teaches the radiation-emitting semiconductor component as in claim 1, wherein at least one of said current spreading layers comprises a recess (the roughened surface between layers 20 and 10a in fig. 3). Also see rejection in claim 16.

38. Regarding claim 29, Ou in view of Chen teaches the radiation-emitting semiconductor component as in claim 28, wherein disposed in said recess is an electrically conductive contact surface (surface of layer 20 in fig. 3).

39. Regarding claim 30, Ou teaches the radiation-emitting semiconductor component as in claim 29, wherein the electrical contacting of said radiation-emitting semiconductor component takes place via said contact surface (through layer 20 that current flow into active layers 13 and 15, see fig.3).

40. Regarding claim 31, Ou teaches the radiation-emitting semiconductor component as in claim 30, wherein disposed on the side of said current spreading layer facing said semiconductor layer sequence and provided with said recess and said contact surface is a jacket layer (layer 10a in fig. 3) or a jacket layer sequence.

41. Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ou et al (PG Pub 2004/0090779 A1) as applied to claims 1 and 21 above, and further in view of Chen et al (PG Pub 2004/0046182 A1).

Regarding claim 23, Ou remains as applied in claim 11. However, Ou does not teach that said radiation-emitting semiconductor component is affixed to said carrier by means of a solder metallization. In the same field of endeavor, Chen teaches a semiconductor component (bipolar transistor, see paragraph [0075]) affixed to a carrier (a substrate) by means of a solder metallization. Thus, it would have been obvious to one of ordinay skill in the art at the time of the invention to use solder metallization to affix said radiation-emitting semiconductor component of Ou's device to said carrier since "[o]ne of ordinary skill in the art would have been capable of applying this known method of enhancement to a "base" device (method, or product) in the prior art and the results would have been predictable to one of ordinary skill in the art." KSR, 550 U.S. at ___, 82 USPQ2d at 1396. Also see MPEP 2143 C. Also note that "solder metallization" feature in this claim is a process by which a product is made and does not carry patentable weight. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.

Regarding claim 24, Ou remains as applied in claim 1. However, Ou does not teach that a solder metallization is disposed on a layer to affix said radiation-emitting semiconductor component to a carrier. In the same field of endeavor, Chen teaches a semiconductor component (bipolar transistor, see paragraph [0075]) affixed to a carrier (a substrate) by means of a solder metallization. Thus, it would have been obvious to one of ordinay skill in the art at the time of the invention to dispose a solder metallization on a layer of the radiation-emitting semiconductor component to affix said radiation-emitting semiconductor component of Ou's device to said carrier since "[o]ne of ordinary skill in the art would have been capable of applying this known method of enhancement to a "base" device (method, or product) in the prior art and the results would have been predictable to one of ordinary skill in the art." KSR, 550 U.S. at ___, 82 USPQ2d at 1396. Also see MPEP 2143 C.

42. Claims 18 and 42-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ou et al (PG Pub 2004/0090779 A1) as applied to claim 17 above, and further in view of Hata et al (PG Pub 2002/0190263 A1).

43. Regarding claims 18, 42, and 43, Ou remains as applied in claim 17. However, Ou does not teach the thickness of said n-conductive and/or said p-conductive layer (AlGaN layer 12 or 16 in fig. 3 of Ou's) is in the range of a monolayer to 1000 nm, less than 400 nm, or between 150 nm and 400 nm. In the same field of endeavor, Hata teaches an AlGaN cladding layer having a thickness of 0.15 microns (150nm, see paragraph [0051]). Thus, it would have been obvious to one of ordinary skill in the art at

the time of the invention make the thickness of said n-conductive and/or said p-conductive layer in the range of a monolayer to 1000 nm, less than 400 nm, or between 150 nm and 400 nm, by optimizing the layer thickness using trials and errors. Also note that discovery of an optimum range is well within the level of ordinary skill in the art, and such ranges will not support patentability unless there is evidence of its criticality. In re Aler, 220 F.2d 454.456.

44. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ou et al (PG Pub 2004/0090779 A1) as applied to claim 1 above, and further in view of Chua et al (PG Pub 2005/0158902 A1).

Regarding claim 47, Ou remains as applied in claim 1. However, Ou does not teach the radiation-emitting semiconductor component as in claim 1, wherein the first current spreading layer and the second current spreading layer are sputtered layers. In the same field of endeavor, Chua teaches using sputtering method to form a current spreading layer (ITO layer, see paragraph [0059]) for the benefit of providing a simplified fabrication process of the device. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the first current spreading layer and the second current spreading layer sputtered layers in Ou's device for the benefit of providing a simplified fabrication process of the device, as disclosed by Chua. Also note that sputtering a process by which a product is made and does not carry patentable weight. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The

patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.

### *Response to Arguments*

45. Applicant's arguments with respect to claims 1-51 have been considered but are moot in view of the new ground(s) of rejection.

### *Allowable Subject Matter*

46. Claims 32 and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FEI FEI YEUNG LOPEZ whose telephone number is (571)270-1882. The examiner can normally be reached on 7:30am-5:00pm Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on 571-272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Feifei Yeung-Lopez/
Examiner, Art Unit 2826

/Minh-Loan T. Tran/
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